

Fig.1A

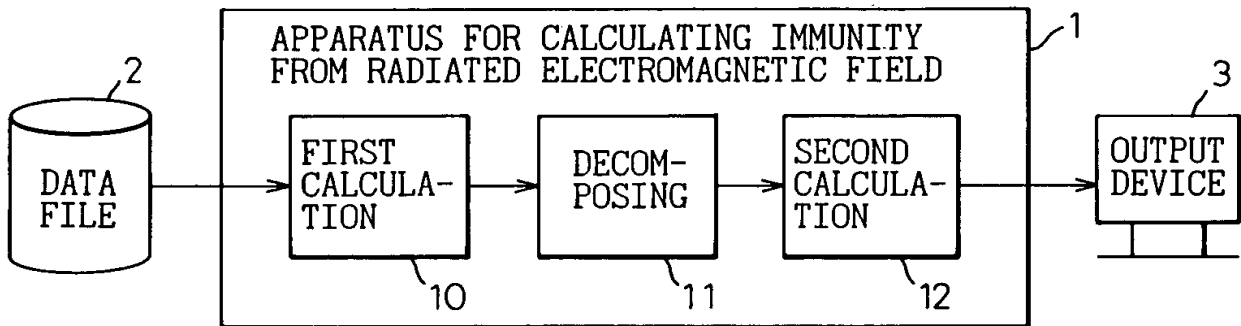


Fig.1B

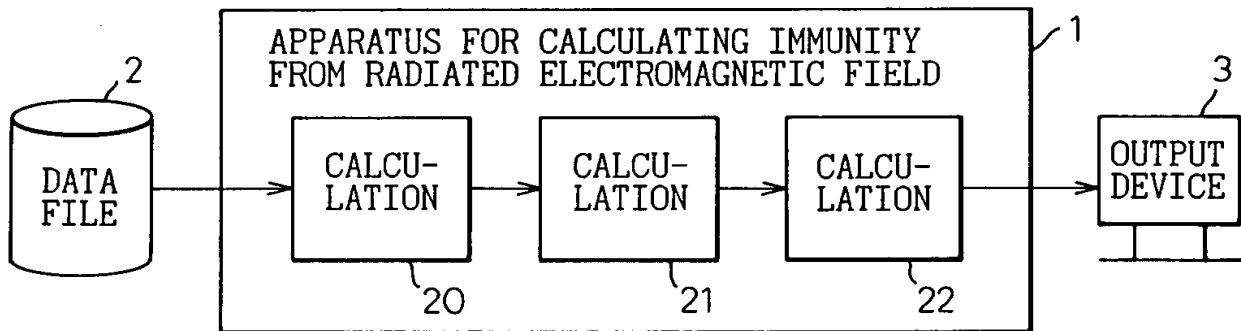
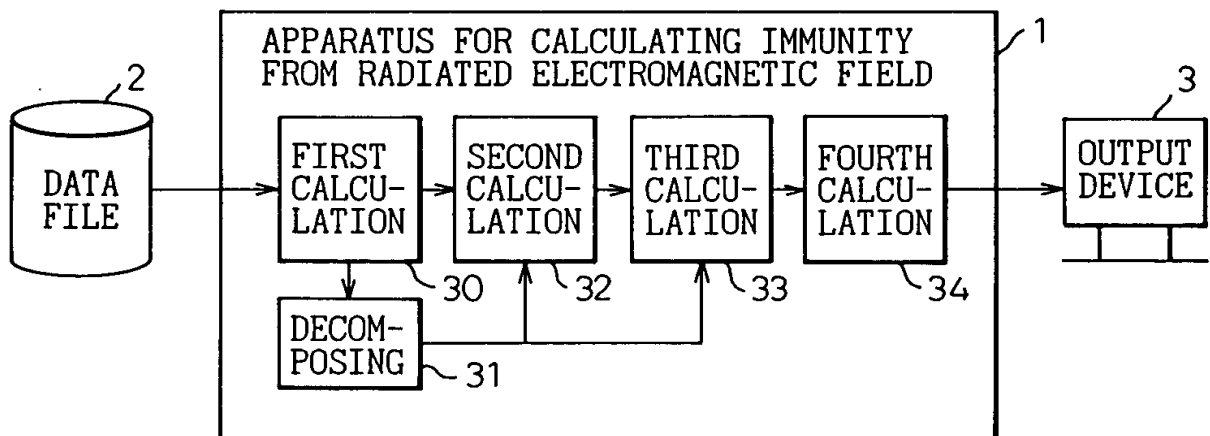
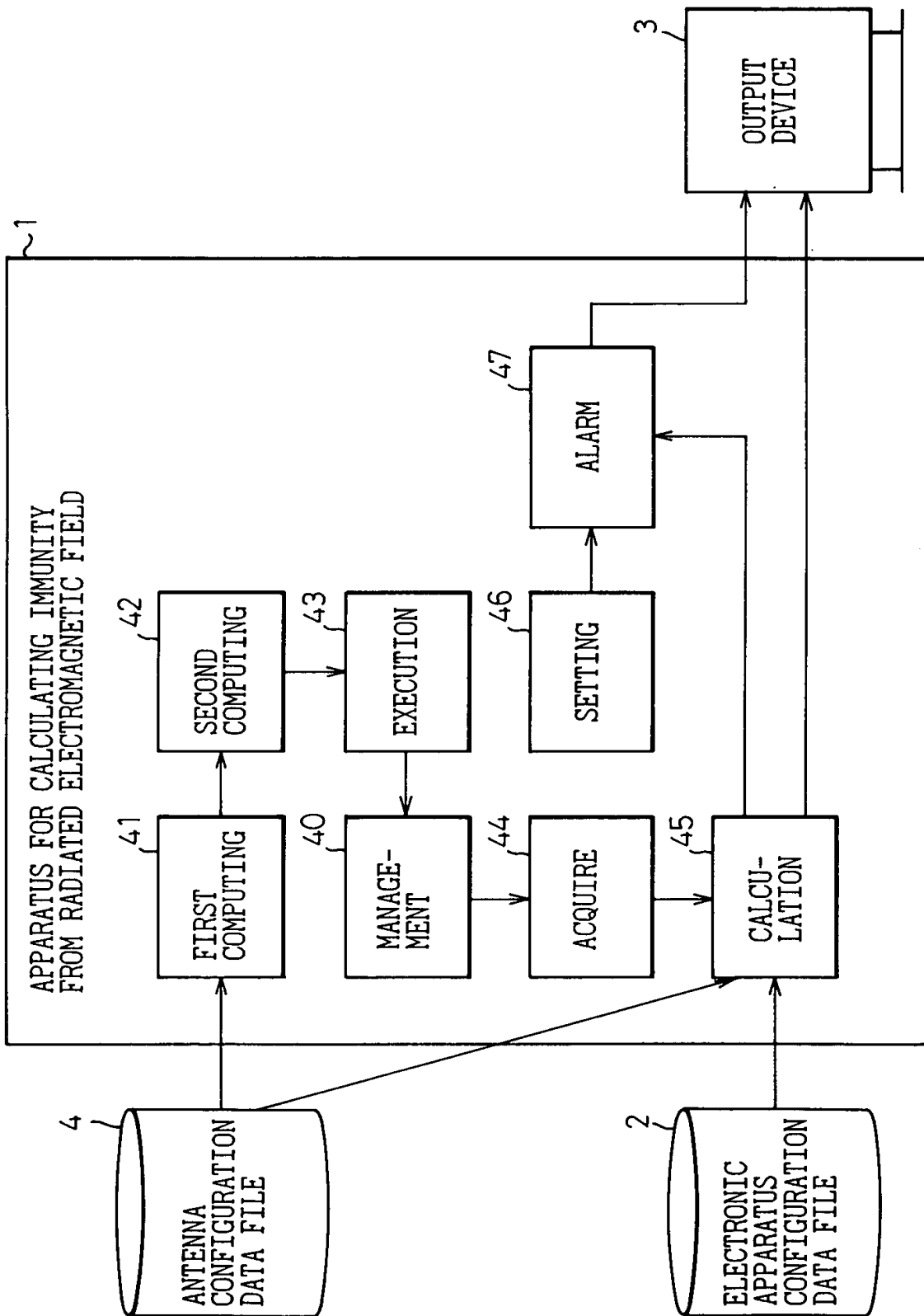


Fig.1C



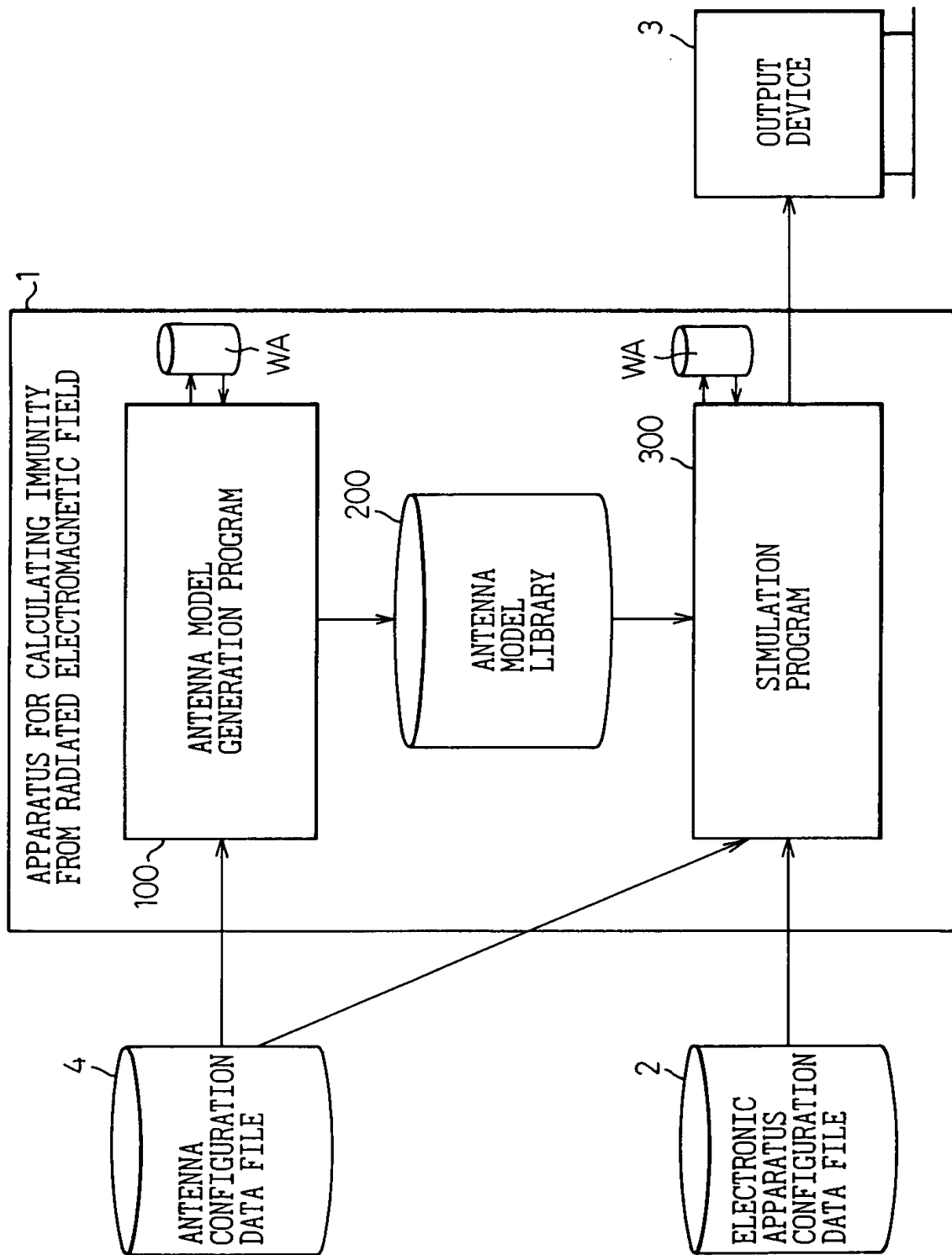
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Fig.2



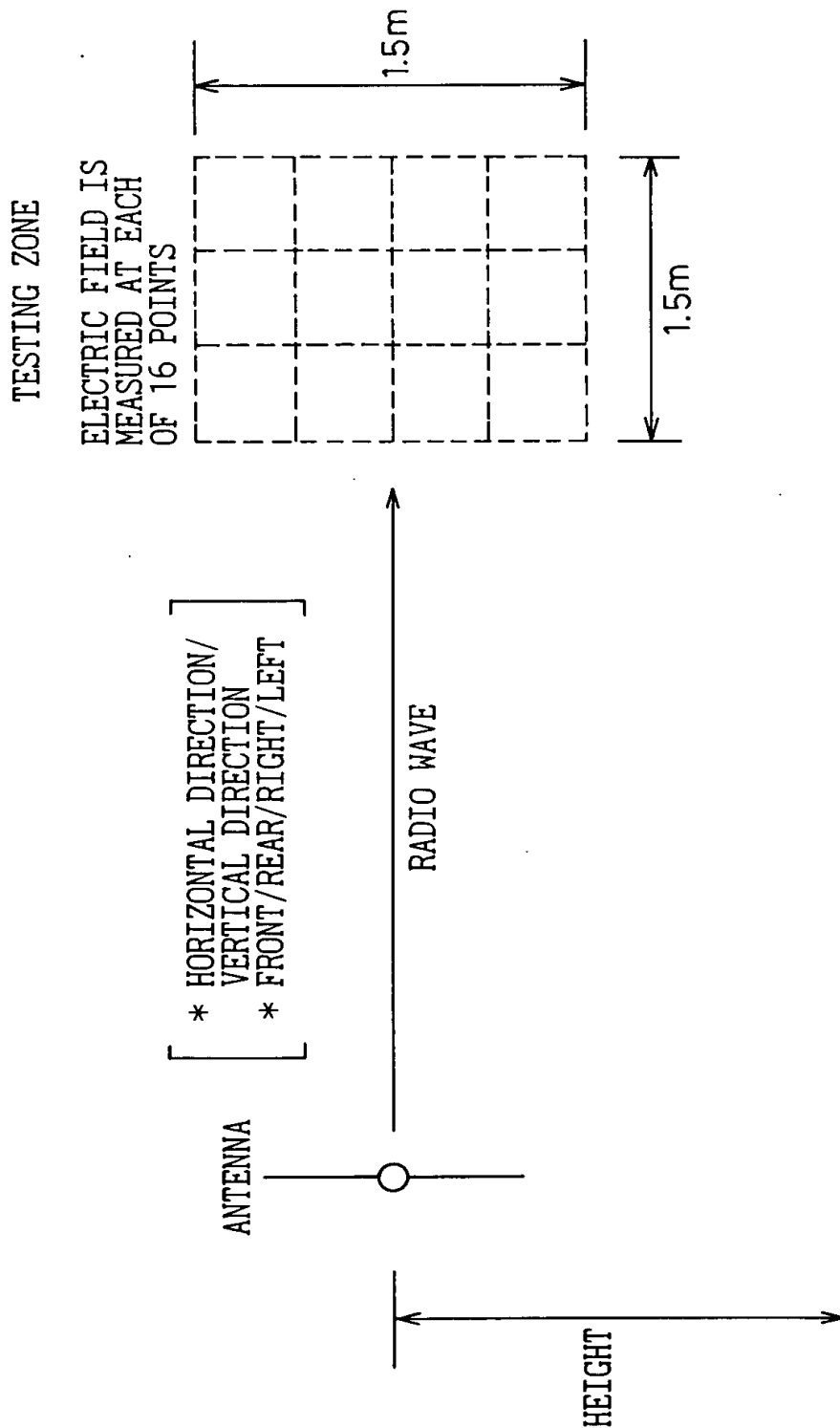
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Fig.3



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Fig.4



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Fig.6A

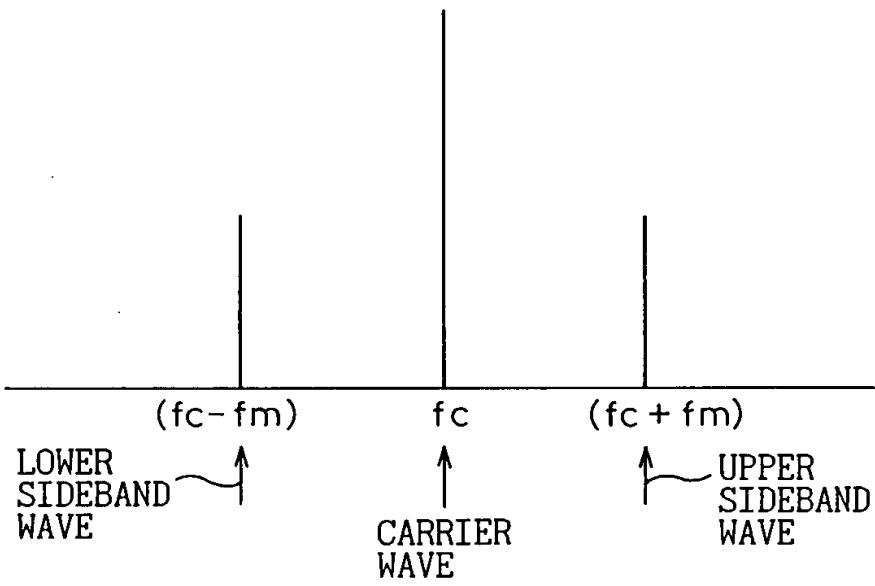


Fig.6B

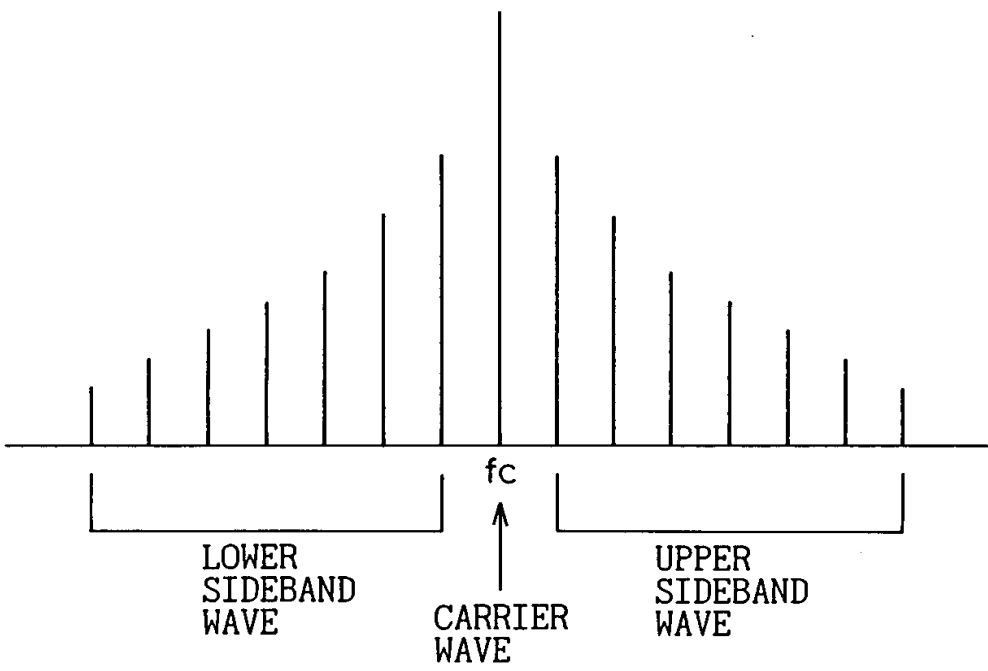
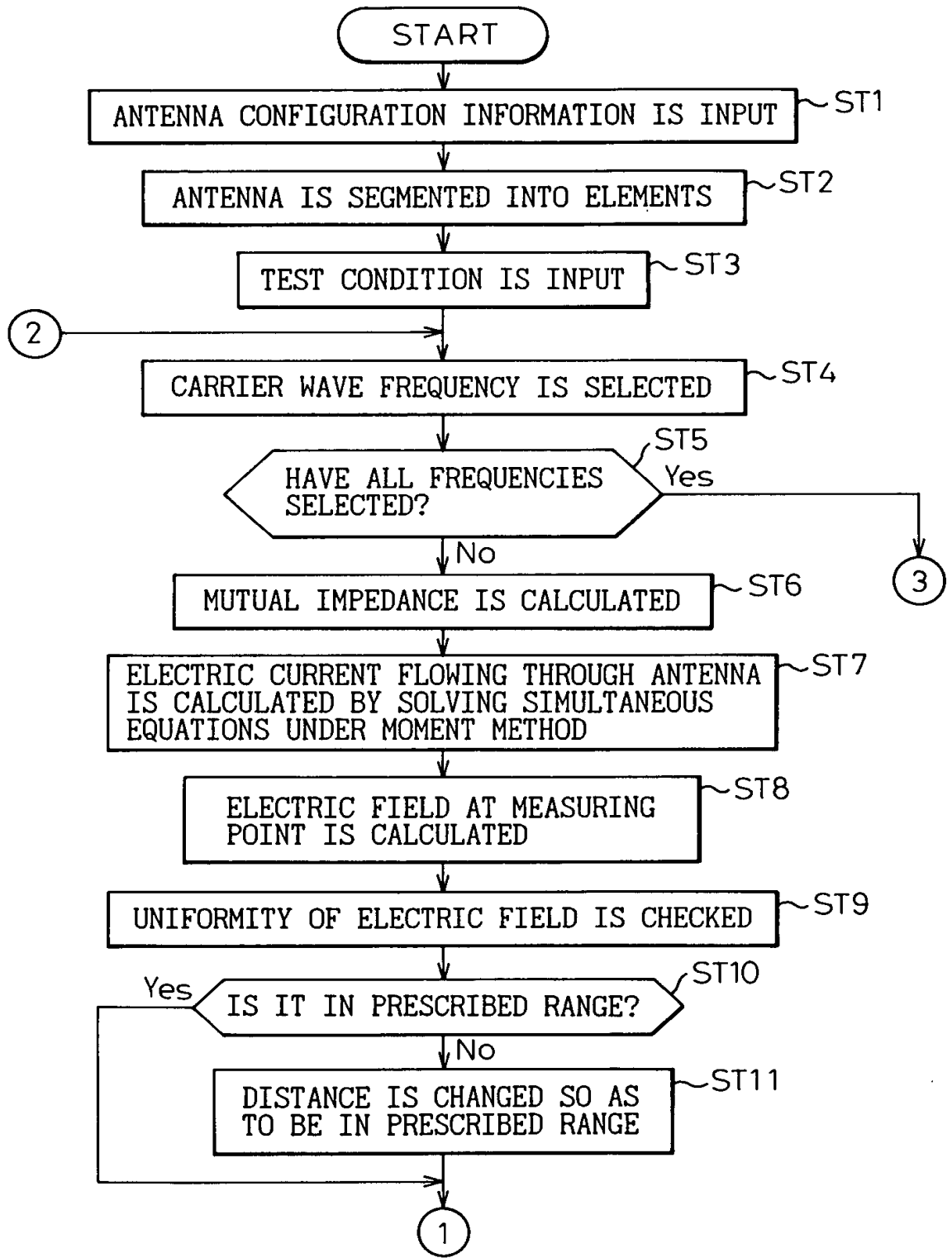


Fig.7



65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80 81 82 83 84 85 86 87 88 89 90 91 92 93 94 95 96 97 98 99 100

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Fig.8A

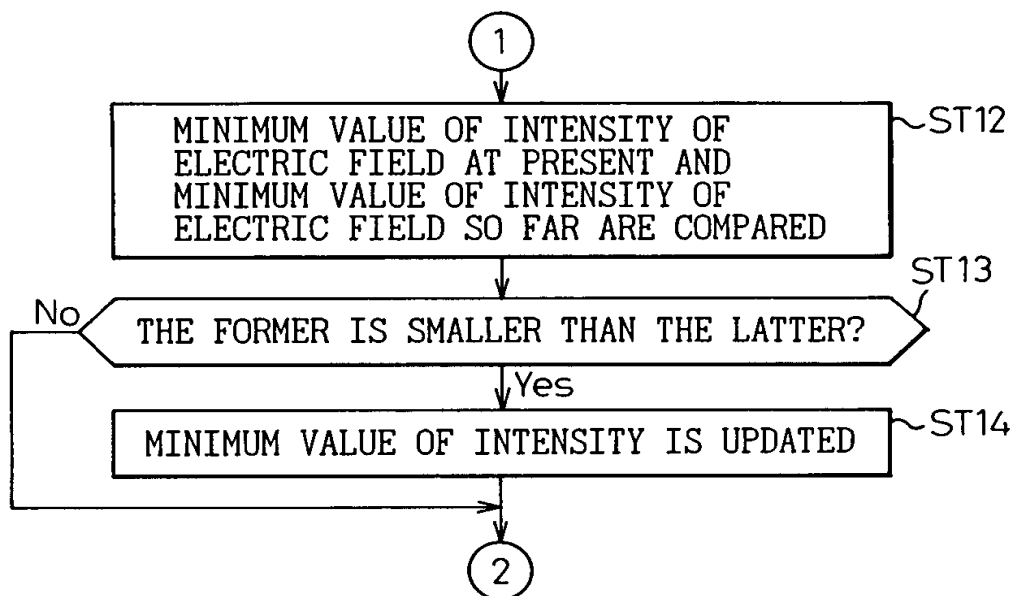
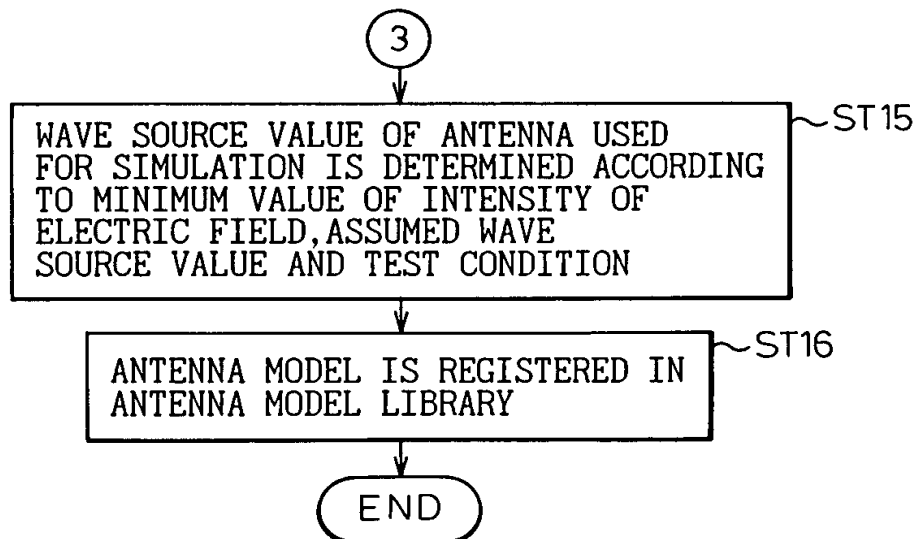


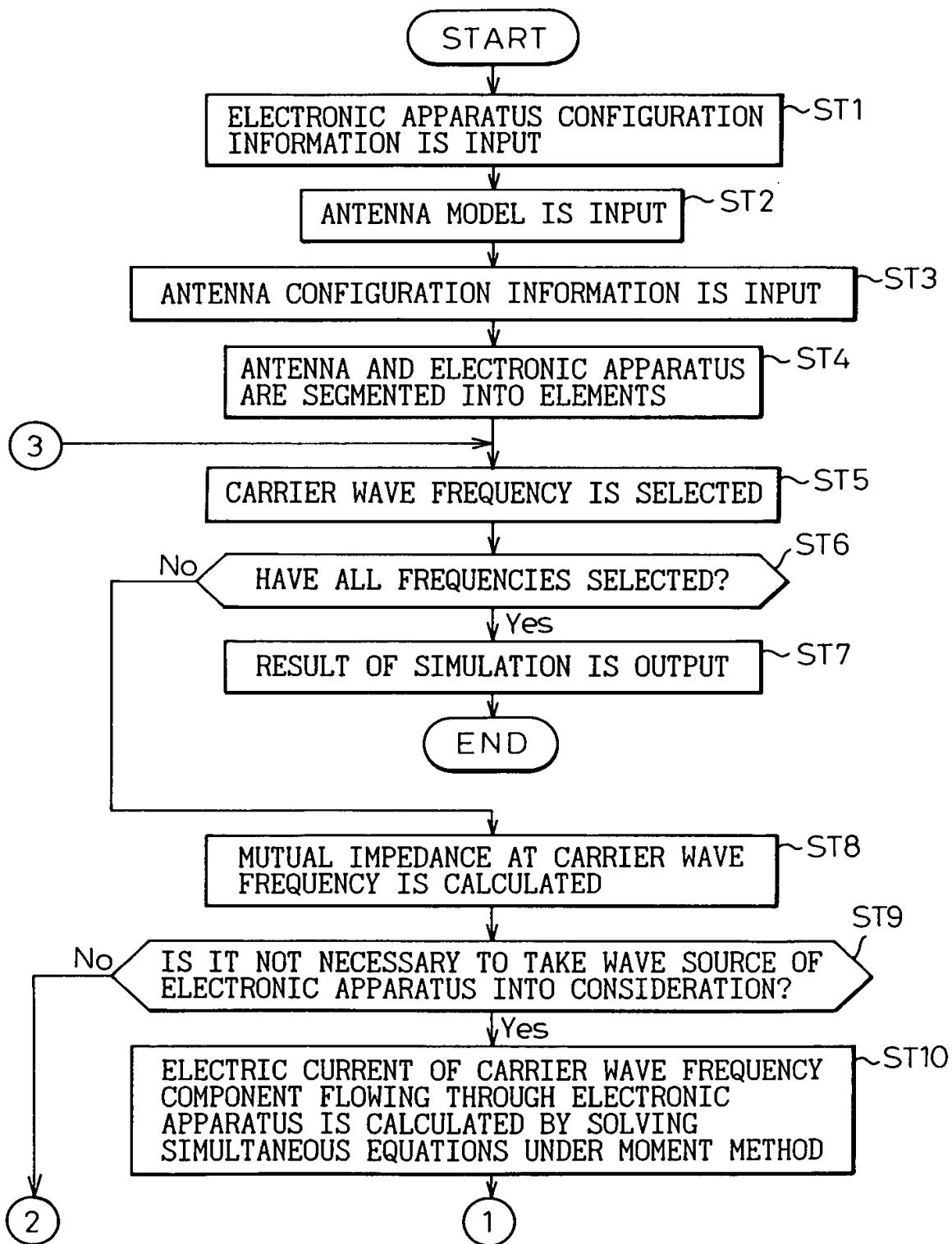
Fig.8B





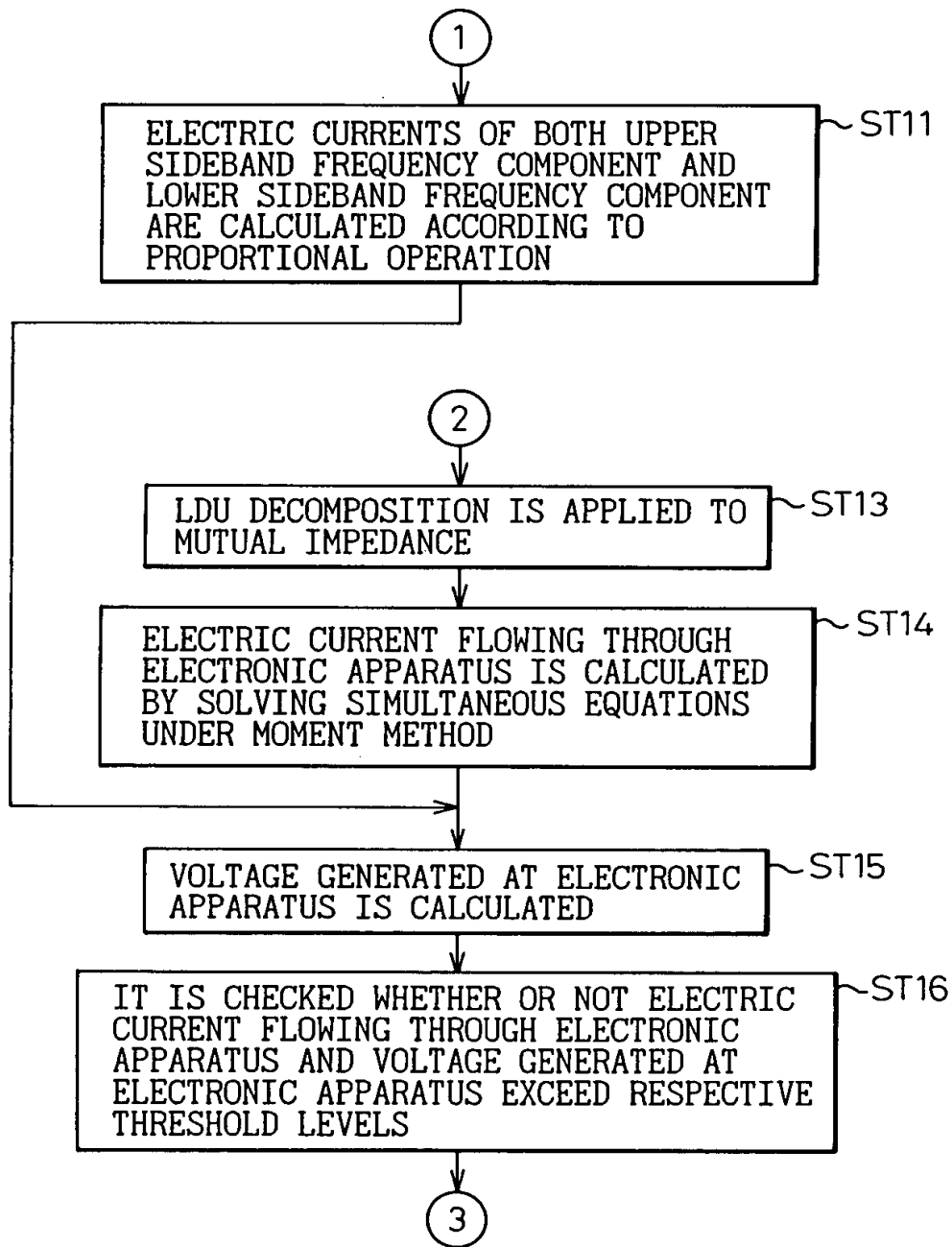
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Fig.9



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Fig.10



65 64 63 62 61 60 59 58 57 56 55 54 53 52 51 50 49 48 47 46 45 44 43 42 41 40 39 38 37 36 35 34 33 32 31 30 29 28 27 26 25 24 23 22 21 20 19 18 17 16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1



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Fig.12A

$$Z = j\omega \int_s \left[ \frac{\mu}{4\pi} J_1 J_2 \cos \phi \frac{e^{-jkr}}{r} + \frac{1}{4\pi \epsilon} \rho_1 \rho_2 \frac{e^{-jkr}}{r} \right] ds$$

Fig.12B

$$Z_{13} = \frac{j\omega \mu}{4\pi \sin kd_1 \sin kd_3} \int_{t_0}^{t_1} \int_{z_0}^{z_1} [\sin k(z-z_0) \sin k(t-t_0) \cos \phi_1 - \cos k(z-z_0) \cos k(t-t_0)] \frac{e^{-jkr}}{r} dz dt$$

$$Z_{14} = \frac{j\omega \mu}{4\pi \sin kd_1 \sin kd_4} \int_{t_1}^{t_2} \int_{z_0}^{z_1} [\sin k(z-z_0) \sin k(-t+t_2) \cos \phi_2 + \cos k(z-z_0) \cos k(-t+t_2)] \frac{e^{-jkr}}{r} dz dt$$

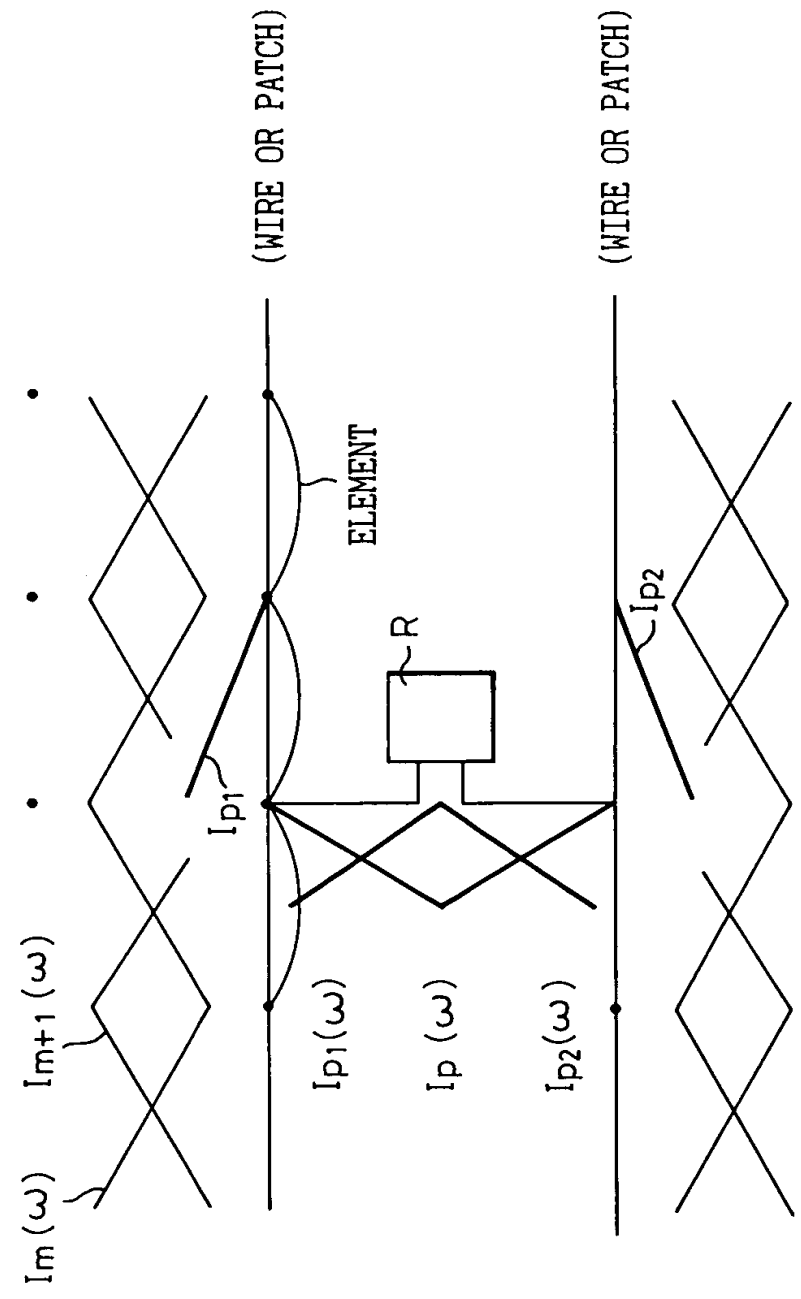
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Fig.13

N: NUMBER OF  
 ELEMENTS  
 WAVE SOURCE  
 ELECTRIC  
 CURRENT  
 MUTUAL IMPEDANCE

$$\begin{bmatrix} Z_{11} & Z_{12} & Z_{13} & \cdot & \cdot & \cdot & Z_{1N} \\ Z_{21} & Z_{22} & Z_{23} & \cdot & \cdot & \cdot & Z_{2N} \\ Z_{31} & Z_{32} & Z_{33} & \cdot & \cdot & \cdot & Z_{3N} \\ \cdot & \cdot & \cdot & \cdot & \cdot & \cdot & \cdot \\ \cdot & \cdot & \cdot & \cdot & \cdot & \cdot & \cdot \\ \cdot & \cdot & \cdot & \cdot & \cdot & \cdot & \cdot \\ Z_{m1} & Z_{m2} & Z_{m3} & \cdot & \cdot & \cdot & Z_{mN} \\ \cdot & \cdot & \cdot & \cdot & \cdot & \cdot & \cdot \\ \cdot & \cdot & \cdot & \cdot & \cdot & \cdot & \cdot \\ \cdot & \cdot & \cdot & \cdot & \cdot & \cdot & \cdot \\ Z_{N1} & Z_{N2} & Z_{N3} & \cdot & \cdot & \cdot & Z_{NN} \end{bmatrix}
 \begin{bmatrix} I_1 \\ I_2 \\ I_3 \\ \cdot \\ \cdot \\ \cdot \\ I_m \\ \cdot \\ \cdot \\ \cdot \\ I_N \end{bmatrix}
 =
 \begin{bmatrix} V_1 \\ V_2 \\ V_3 \\ \cdot \\ \cdot \\ \cdot \\ V_m \\ \cdot \\ \cdot \\ \cdot \\ V_N \end{bmatrix}$$

Fig.14



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Fig.15A

$$I_p(Z_{pp}+R)+I_{p1} Z_{pp}+I_{p2} Z_{pp2}+\sum_{n=1}^M I_n Z_{pn}=0$$

Fig.15B

$$I_p = \frac{-1}{Z_{pp}+R} [I_{p1} Z_{pp1}+I_{p2} Z_{pp2}+\sum_{n=1}^M I_n Z_{pn}]$$

Fig.15C

$$V_p = I_p R = \frac{-R}{Z_{pp}+R} [I_{p1} Z_{pp1}+I_{p2} Z_{pp2}+\sum_{n=1}^M I_n Z_{pn}]$$

Fig.16

$$Z = LDU = L D^t L =$$

$$\begin{bmatrix} 1 & 0 & \cdot & \cdot & \cdot & 0 \\ l_{21} & 1 & \cdot & \cdot & \cdot & 0 \\ \cdot & \cdot & 1 & \cdot & \cdot & 0 \\ \cdot & \cdot & \cdot & 1 & \cdot & 0 \\ \cdot & \cdot & \cdot & \cdot & 1 & 0 \\ \cdot & \cdot & \cdot & \cdot & \cdot & 1 \end{bmatrix} \begin{bmatrix} d_{11} & 0 & \cdot & \cdot & \cdot & 0 \\ 0 & 1 & \cdot & \cdot & \cdot & 0 \\ \cdot & \cdot & 1 & \cdot & \cdot & 0 \\ \cdot & \cdot & \cdot & 1 & \cdot & 0 \\ \cdot & \cdot & \cdot & \cdot & 1 & 0 \\ 0 & \cdot & \cdot & \cdot & \cdot & d_{nn} \end{bmatrix} \begin{bmatrix} 1 & \cdot & \cdot & \cdot & \cdot & l_{nn-1} \\ l_{21} & 1 & \cdot & \cdot & \cdot & 1 \\ \cdot & \cdot & 1 & \cdot & \cdot & 0 \\ \cdot & \cdot & \cdot & 1 & \cdot & 0 \\ \cdot & \cdot & \cdot & \cdot & 1 & 0 \\ \cdot & \cdot & \cdot & \cdot & \cdot & 1 \end{bmatrix}$$



66 72 22 34 23 22

Fig.17

$$Z = LU = \begin{bmatrix} 1 & 0 & \dots & \dots & \dots & 0 \\ l_{21} & \dots & \dots & \dots & \dots & \dots \\ \vdots & \vdots & \vdots & \vdots & \vdots & \vdots \\ \vdots & \vdots & \vdots & \vdots & \vdots & \vdots \\ \vdots & \vdots & \vdots & \vdots & \vdots & \vdots \\ l_{n1} & \dots & \dots & \dots & l_{nn-1} & 1 \end{bmatrix} \begin{bmatrix} U_{11} & U_{12} & \dots & \dots & \dots & U_{1n} \\ 0 & \dots & \dots & \dots & \dots & \dots \\ \vdots & \vdots & \vdots & \vdots & \vdots & \vdots \\ \vdots & \vdots & \vdots & \vdots & \vdots & \vdots \\ \vdots & \vdots & \vdots & \vdots & \vdots & \vdots \\ 0 & \dots & \dots & \dots & 0 & U_{nn} \end{bmatrix}$$

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Fig.18

$$\begin{bmatrix}
 Z^0_{c,c} & Z^0_{c,d} & B^0_{c,d} \\
 Z^0_{d,c} & Z^0_{d,d} + Z^d_{d,d} & B^0_{d,d} + B^d_{d,d} \\
 B^0_{d,c} & B^0_{d,d} + B^d_{d,d} & -Y^0_{d,d} - Y^d_{d,d}
 \end{bmatrix}
 \begin{bmatrix}
 I_{c,n} \\
 I_{d,n} \\
 M_n
 \end{bmatrix}
 =
 \begin{bmatrix}
 V_i \\
 0 \\
 0
 \end{bmatrix}$$

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